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in other striated muscle, and that its excessive tenuity is probably the cause of its escaping observation.

XVI. "Researches on the Structure, Physiology, and Development of *Antedon* (*Comatula*, Lamk.) *rosaceus*." By Dr. W. B. CARPENTER, F.R.S. Received June 15, 1865.

(Abstract).

The author, after adverting to the special interest attaching to the study of this typical form, as the only one readily accessible for the elucidation of the life-history of the CRINOIDEA, states it to be his object to give as complete an account as his prolonged study of it enables him to offer, of its minute structure, living actions, and developmental history, taking up the last at the point to which it has been brought in the memoir of Prof. Wyville Thomson.

He prefaces his memoir with an historical summary of the progress of our knowledge of the distinctive peculiarities of this genus, and of its relation to the Crinoidea; and he shows that the first recognition of this relationship was most distinctly made by Llhuyd, at the beginning of the last century, though that recognition has been passed without notice by most subsequent writers, and is altogether ignored by MM. de Koninck and le Hon in their recent history.

The author then proceeds to describe the external characters of *Antedon rosaceus*; and shows, from its habits as observed in a vivarium, that although possessed of locomotive power, it makes so little use of this under ordinary circumstances, that its life in the adult condition, no less than in its earlier stage, is essentially that of a pedunculate Crinoid.

He then gives a minute description of the several pieces of the skeleton—the accounts of these previously given by J. S. Miller and Prof. Joh. Müller not being in sufficient detail to serve as standards of comparison to which the parts of fossil Crinoids may be referred. And he directs special attention to the curiously inflected rosette-like plate, previously unnoticed, which occupies the central space left within the annulus formed by the adhesion of the first radials. This plate is in special relation to the organ termed by Joh. Müller the "heart," but certainly having no proper claim to that designation, being a quinquepartite cavity in the central axis, from the walls of which there pass out not vessels but solid cords of sarcodae, into the rays and arms, and also into the dorsal cirri. The inflexions of the rosette-like plate serve for the support and protection of the large cords passing into the rays, each of which has a double origin, and a connexion with the adjacent radiating cords that reminds the anatomist of the "circle of Willis."

The skeleton of the adult differs so widely in the forms and relations of its parts from that of the early Pentacrinoid larva described by Prof. Wyville Thomson, that the derivation of the former from the latter can only be understood by observation of all the intermediate stages. When

the calcareous skeleton of the calyx first shows itself, it consists only of five *oral* plates arranged conformably upon five *basal* plates, as thus:—

O	O	O	O	O
B	B	B	B	B

At a stage a little more advanced (which has been described by Prof. Allman, Trans. Roy. Soc. Ed. vol. xxiii. p. 241), the rudiments of the *first radials* are found interposed between the orals and basals, alternating in position with both, as in the margin; and between two of these

first radials there appears a single small unsymmetrical

O	O	O	O	O
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 plate, which afterwards proves to be the *anal*. The

a	a	a	a	a
---	---	---	---	---

 first radials undergo a rapid increase in size, and

B	B	B	B	B
---	---	---	---	---

 soon become surmounted by *second* and *third* radials, which project between the orals; whilst the orals and basals, undergoing no such increase, are relatively very much smaller; the *anal* plate is still found on the line of the first radials. But

from this time the radials form the principal part of the calyx, which opens out widely in conformity with the increase of space required for the digestive apparatus, the intestinal canal being now developed around what was originally a simple stomach with one orifice. The highest

joint of the stem also undergoes a remarkable increase in size, and begins to acquire the form of a basin with an inflected rim, constituting what is known in the adult as the *centro-dorsal* piece. When the calyx opens out, the five *oral* plates which originally formed a circlet around the mouth, retain that position, and detach themselves entirely from the divergent radials, nothing but the soft perisomatic membrane filling up the space between them. These *oral* plates never increase in size, and towards the end of the Pentacrinoid stage they begin to undergo absorption. I can still trace their basal portions in young specimens of the free *Antedon*; but as the creature advances towards maturity they are altogether lost sight of. When the intestinal canal has been sufficiently developed to open on the surface of the oral disk, the *anal* plate is lifted out of the position it originally occupied, and is at last found on the anal funnel, far removed from the radials. This, like the oral plates, begins to undergo absorption towards the end of the crinoidal stage, and completely disappears in the early part of the life of the free *Antedon*. The *radial* plates increase not only in size but also in thickness; and channels which are left on their internal surface by vacuities in the calcareous network, are converted into canals by a further inward growth of this, which completely covers them in. It is through these canals that the cords of sarcode pass to the arms. The *basal* plates, like the oral, remain stationary in point of size, and present no change in appearance or position until after they have been completely concealed externally by the *centro-dorsal* piece (the highest joint of

